



PAO:U09-553



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**Net Zero Plus JCTD:
Evaluation of Energy
Saving Technologies for
Expeditionary Shelters**

*Brant Lagoon
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Presented to JOCOTAS
4 November 2009*

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Net Zero + JCTD – NSRDEC Purpose



- Leverage NSRDEC Energy Savings Technologies

- Photovoltaics
- Advanced Insulation
- LED-based Lighting
- Solar Shades



Solar Covers Block 60% of Radiant heat.
Modular from 900 sf to 10,000 sf



Aerogel Silica Mesh
Insulation



L'Garde Air Cell
Insulation

- Need for foam alternatives

- Force Provider, Field Hospitals
- Cost
- Safety
- Redeployment



Electroluminescent Lighting System



Shelter LED Lighting with Ambience



Small Tactical Airbeam Tent Deployed as
Force Provider 150 Soldier Base Camp



Modular Ballistic Protection System
(MBPS) Set Up Time, 2 min. per linear foot



MBPS meets Unified
Facilities Criteria for
Blast Over Pressure



BB2950 Battery charger
for Comms and Sensors



QUADrant units &
Balance of Systems
converts DC to AC
and stores reserves

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PowerShade (1 - 3KW)
also blocks 90% of
radiant heat

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Evaluation Overview



- **Goals**

- Compare baseline energy usage to energy efficient technologies
 - Evaluate various configurations for optimization
 - Relevant environmental conditions
- Create a comparative and comprehensive report
 - Power Usage will be primary metric – Generator and fuel usage
 - Draw conclusions on recommended shelter system configurations

- **Compare results to foam data**

- **Technologies**

- Solar Barrier Systems:
 - Ultra Lightweight Camouflage Net System (*ULCANS*)
 - Advanced Solar Shades (new config)
 - Power Shade (including Photovoltaic Panels (2kW))
- High Efficiency Lighting Systems:
 - Light Emitting Diodes (Three Sets)
 - Electroluminescent Panels
- Advanced Insulation:
 - Aerogel Liner
 - FiFoil Insulation
 - TEMPER Insulated Liner
 - Improved Tent Liner (with solar barrier material)

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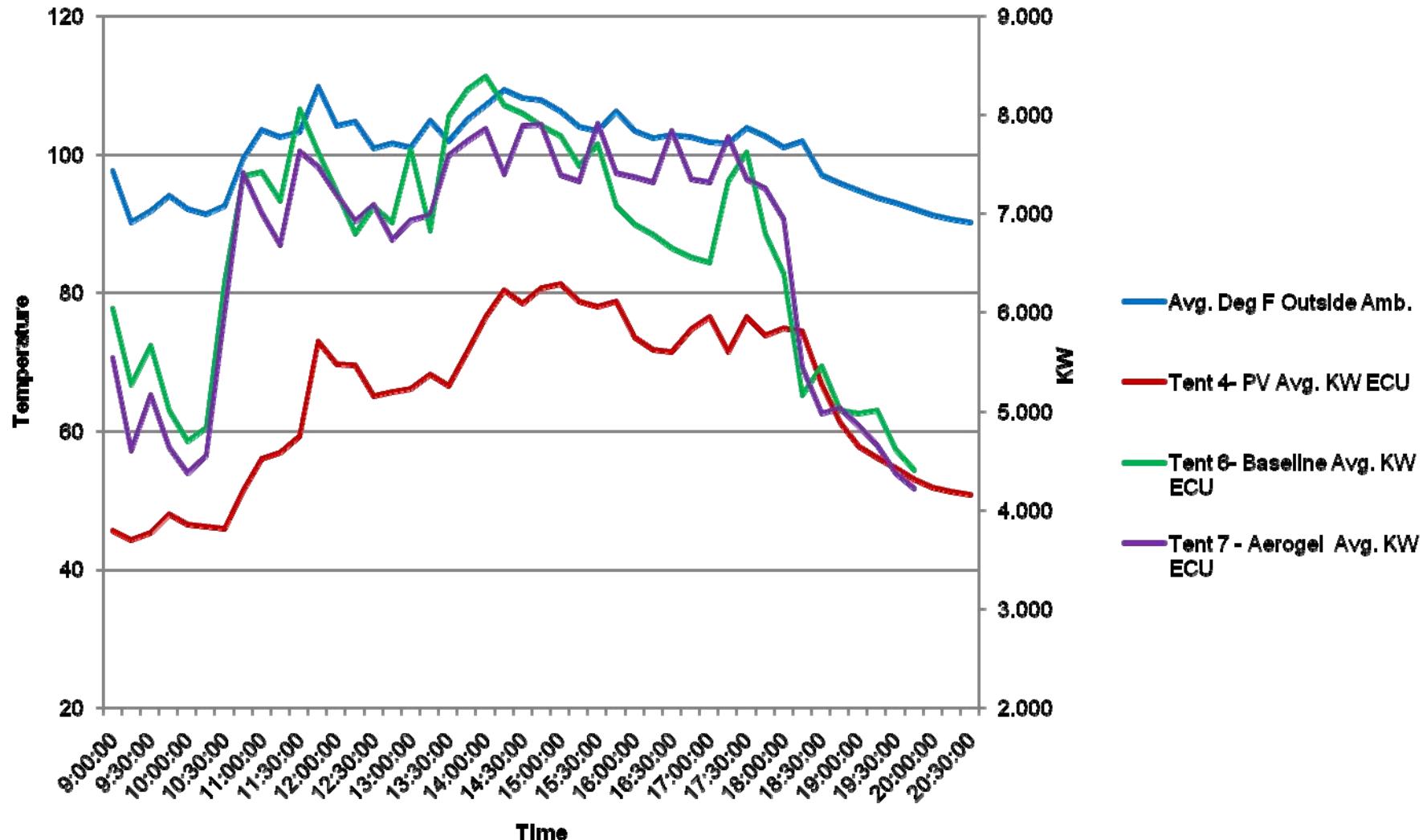
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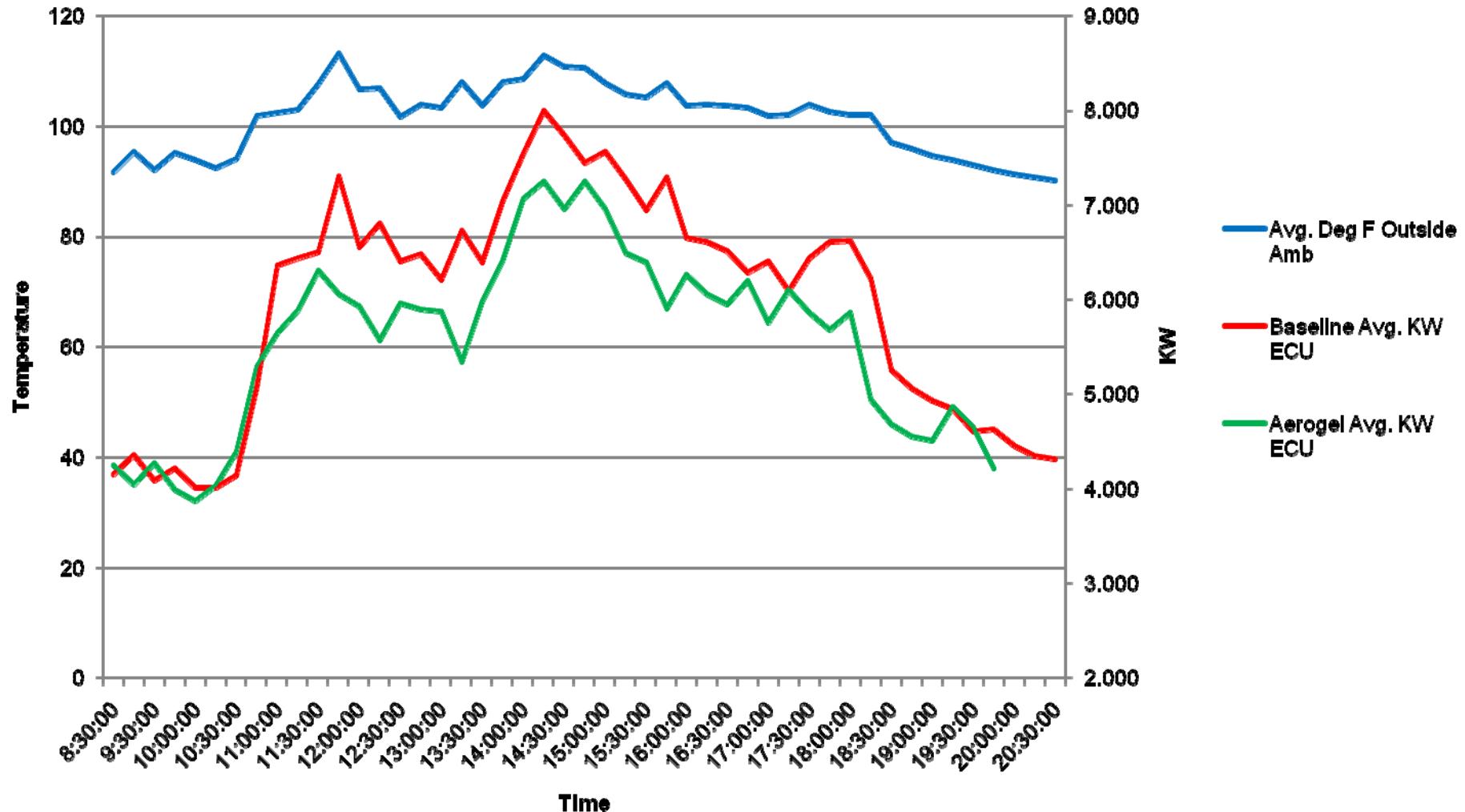
All Airbeam Tents



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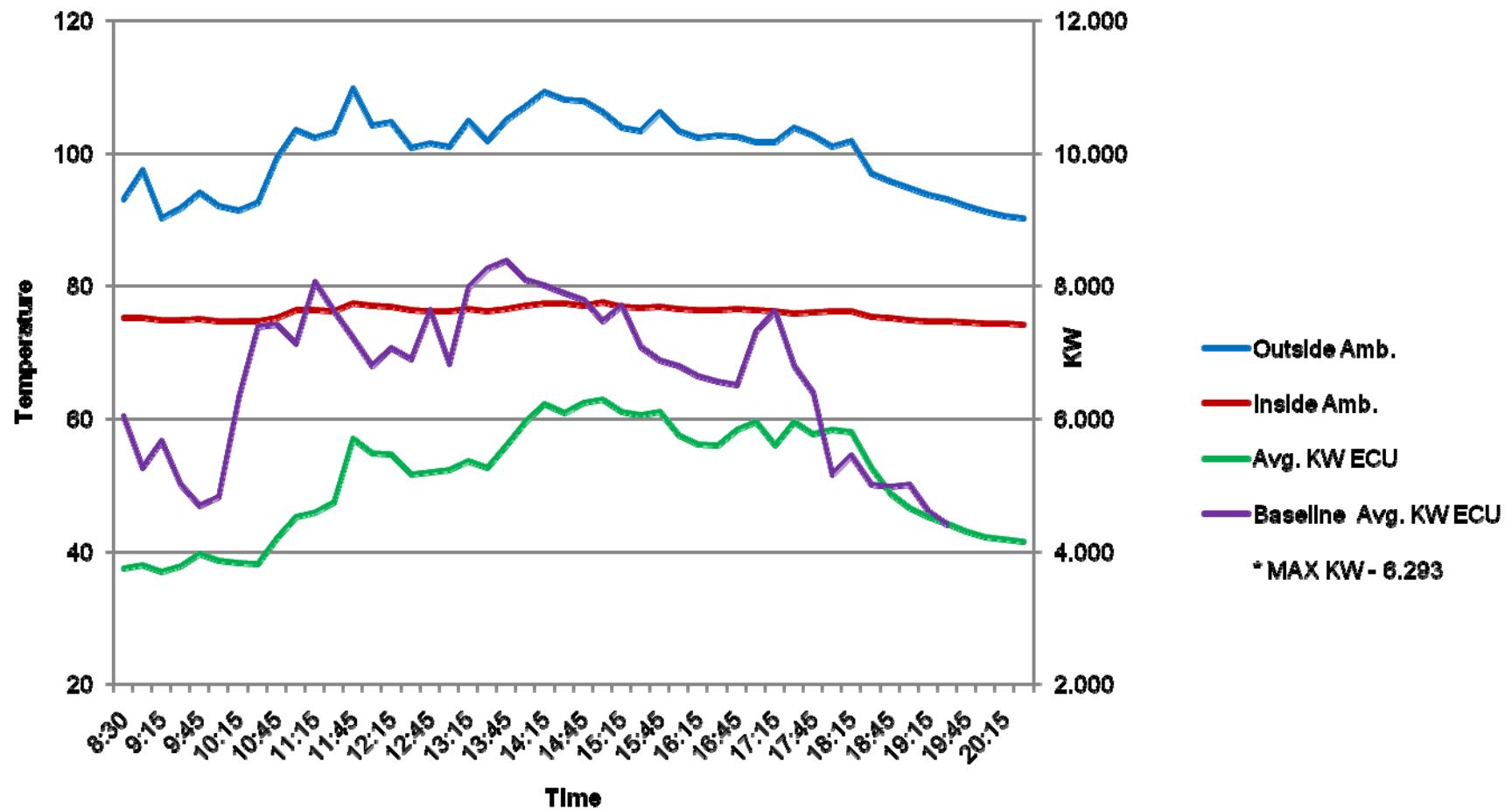
All TEMPER Tents



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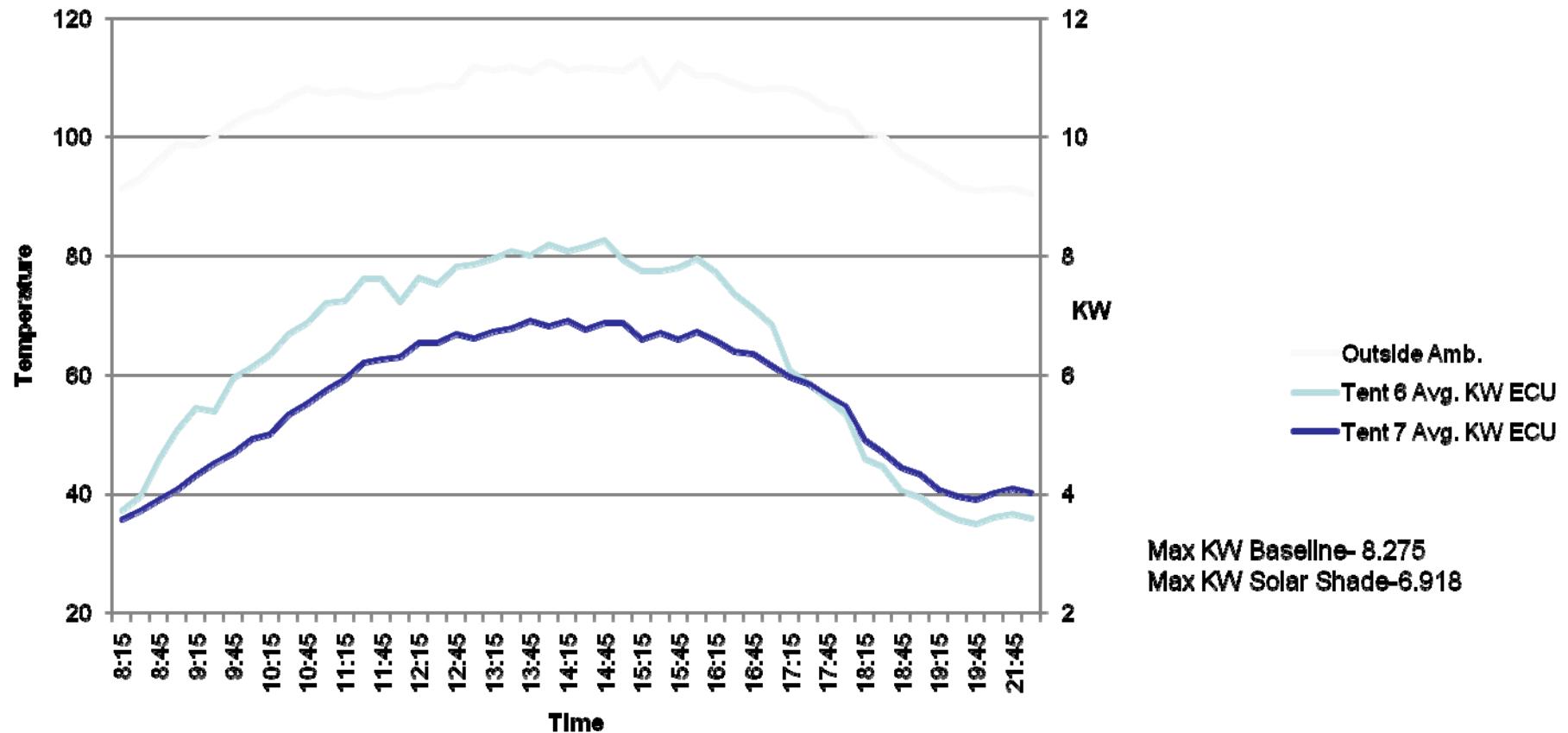
Baseline vs. Airbeam w/PV



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Baseline vs Solar Shade



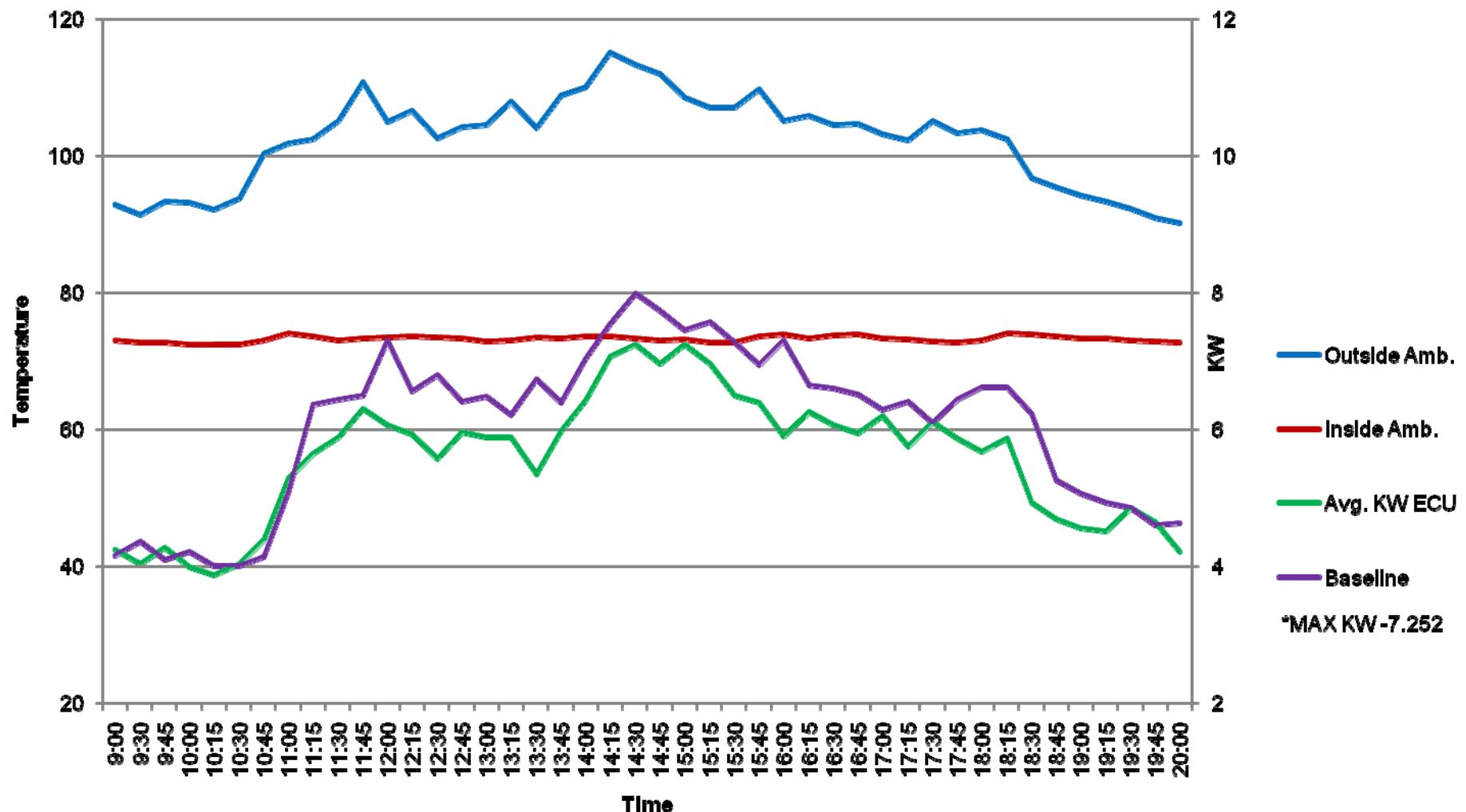
Baseline vs Airbeam w/Aerogel



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Baseline vs. Temper w/Aerogel

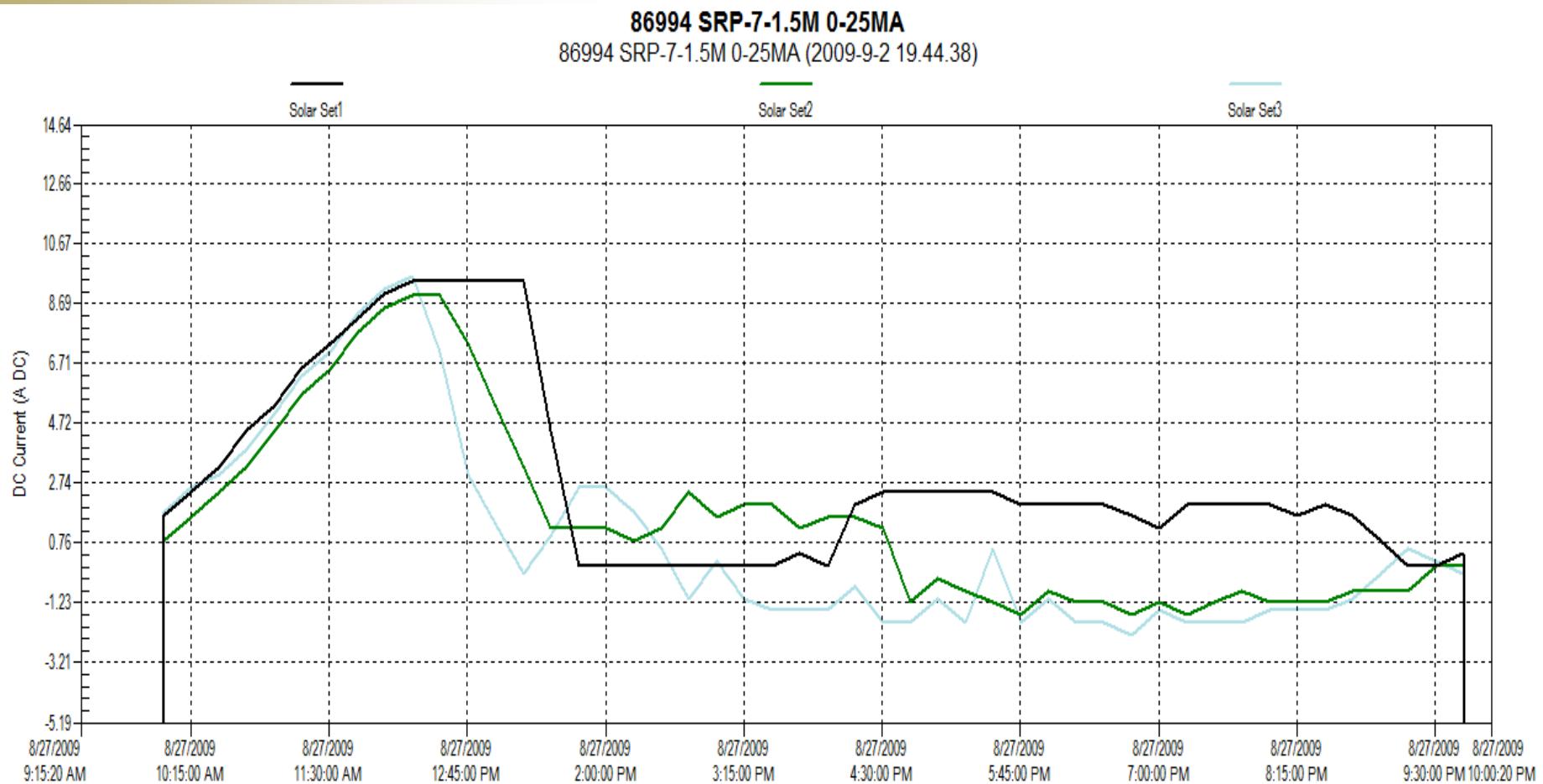


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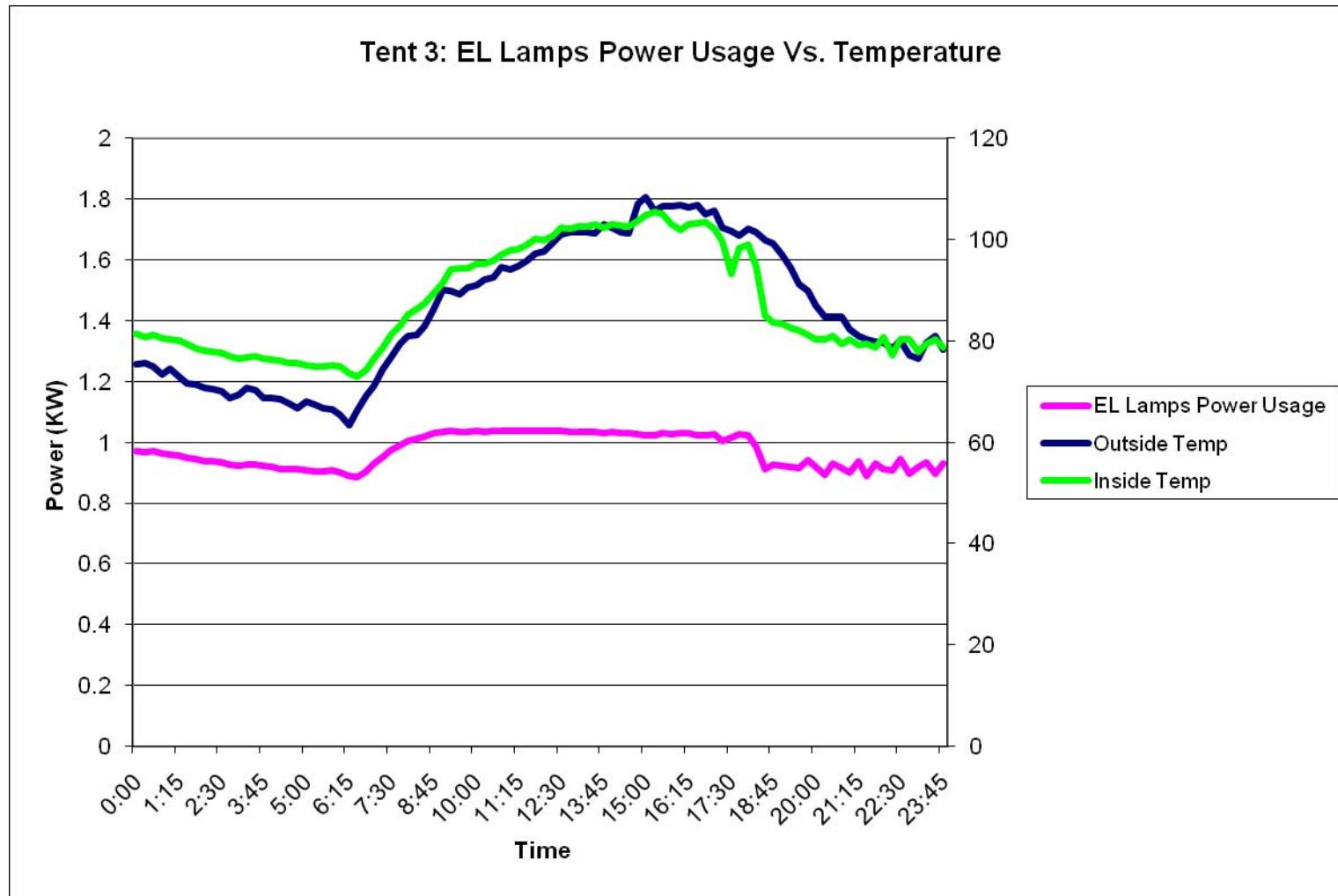


PV Solar Production



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Current Status



- Seven Shelter Systems Established
 - SOF compound at LSA Warrior at NTC
 - All seven tents now have air conditioning, data collection is being built currently, install planned for 16-20 Nov
- NSRDEC making monthly visits to the evaluation site
 - Download data and change out technology configurations
 - EPCC installed, ULCANS for fuel and water bladders
- Soldier involvement is wild card; soldier feedback
- Next Steps
 - Develop remainder of evaluation matrix
 - Challenge of winter
 - Changing out configurations
 - Air Force adds four tents – Nov
 - Priorities for FP are to field solar shade for airbeam and develop LED spec
 - Foam tents as baseline to aim for
 - Continue to analyze data for impacts on power and fuel usage
 - Run return on investment and life cycle cost analysis **TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

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Questions?



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